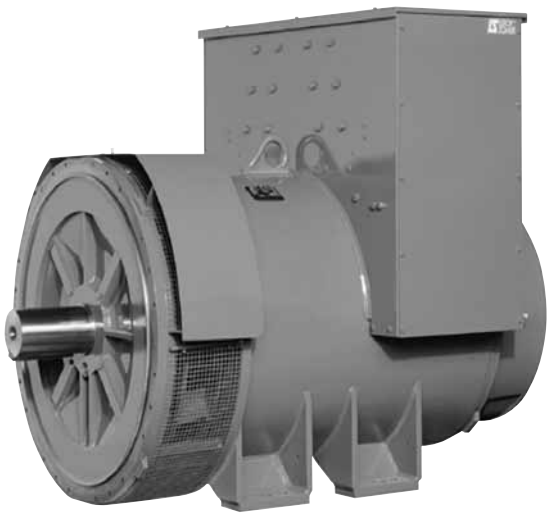
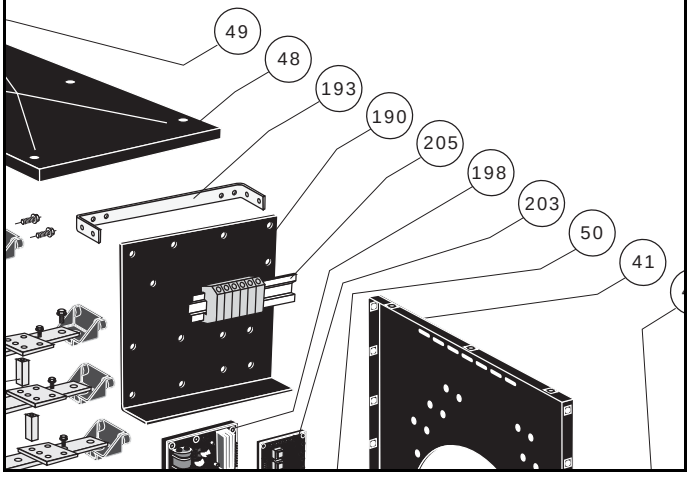
LEROY SOMER®

Réf. 3281 en - 10.2007 / g



This manual is to be given to the end user



LSA 50.1 / LSA 51.2

ALTERNATORS

Installation and maintenance

LSA 50.1 / LSA 51.2
ALTERNATORS

This manual concerns the alternator which you have just purchased.

The latest addition to a whole new generation of alternators, this range benefits from the experience of the leading manufacturer worldwide, using advanced technology and incorporating strict quality control.

We wish to draw your attention to the contents of this maintenance manual. By following certain important points during installation, use and servicing of your alternator, you can look forward to many years of trouble-free operation.

SAFETY MEASURES

Before using your machine for the first time, it is important to read the whole of this installation and maintenance manual.

All necessary operations and interventions on this machine must be performed by a qualified technician.

Our technical support service will be pleased to provide any additional information you may require.

The various operations described in this manual are accompanied by recommendations or symbols to alert the user to potential risks of accidents. It is vital that you understand and take notice of the following warning symbols.

WARNING

Warning symbol for an operation capable of damaging or destroying the machine or surrounding equipment.

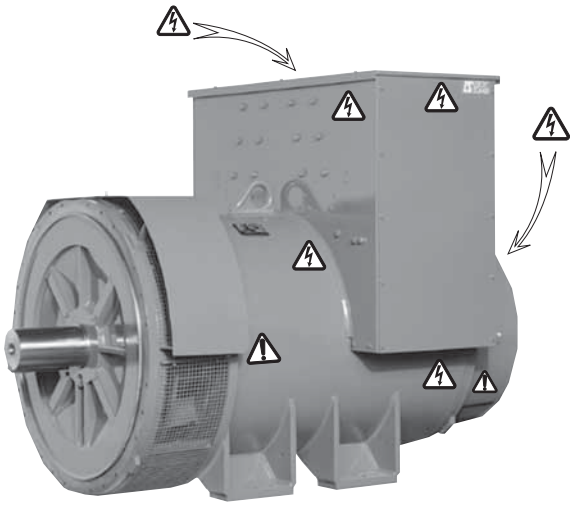
Warning symbol for general danger to personnel.

Warning symbol for electrical danger to personnel.

Note : LEROY-SOMER reserves the right to modify the characteristics of its products at any time in order to incorporate the latest technological developments. The information contained in this document may therefore be changed without notice.

WARNING SYMBOLS

A set of self-adhesive stickers depicting the various warning symbols is included with this maintenance manual. They should be positioned as shown in the drawing below once the machine has been fully installed.



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LSA 50.1 / LSA 51.2
ALTERNATORS

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1 - RECEIPT

1.1 - Standards and safety measures

Our alternators comply with most international standards and are compatible with :
- the recommendations of the
International Electrotechnical Commission
IEC 34-1, (EN 60034).
- the recommendations of the
International Standards Organisation ISO 8528.
- the European Community directive 89/336/EEC on Electromagnetic Compatibility (EMC).
- the European Community directives 73/23/EEC and 93/68/EEC (Low Voltage Directive).
They are CE marked with regard to the LVD (Low Voltage Directive) in their role as a machine component. A declaration of incorporation can be supplied on request.
Before using your generator for the first time, read carefully the contents of this installation and maintenance manual, supplied with the machine. All operations performed on the generator should be undertaken by qualified personnel with specialist training in the commissioning, servicing and maintenance of electrical and mechanical machinery. This maintenance manual should be retained for the whole of the machine's life and be handed over with the contractual file.
The various operations described in this manual are accompanied by recommendations or symbols to alert the user to potential risks of accidents. It is vital that you understand and take notice of the different warning symbols.

1.2 - Inspection

On receipt of your alternator, check that it has not suffered any damage in transit. If there are obvious signs of knocks, contact the transporter (you may able to claim on their insurance) and after a visual check, turn the machine by hand to detect any malfunction.

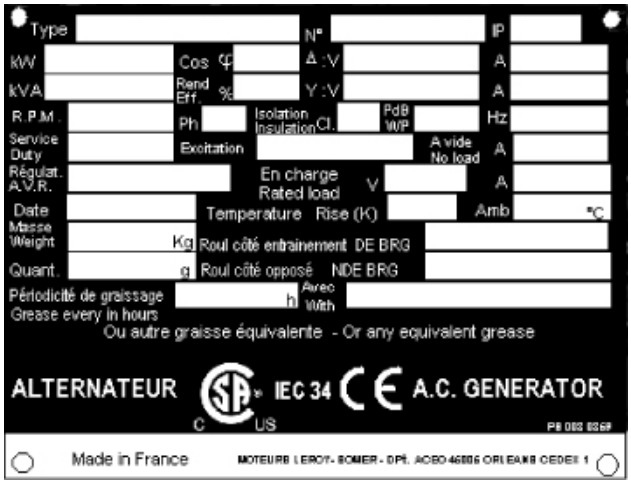
1.3 - Identification

The alternator is identified by means of a nameplate fixed on the frame.
Make sure that the nameplate on the machine conforms to your order.
The machine name is defined according to various criteria (see below).
Example of description for : **LSA 50.1 M6/4 -**
• LSA : name used in the PARTNER range
M : Marine / C : Cogeneration / T : Telecommunications
• 50.1 : machine type
• M6 : model
• 4 : number of poles

1.3.1 - Nameplate

So that you can identify your machine quickly and accurately, we suggest you fill in its specifications on the nameplate

.



1.4 - Storage

Prior to commissioning, machines should be stored :
- Away from humidity : in conditions of relative humidity of more than 90%, the machine insulation can drop very rapidly, to just above zero at around 100%; monitor the state of the anti-rust protection on unpainted parts.
For storage over an extended period, the machine can be placed in a sealed enclosure (heatshrunk plastic for example) with dehydrating sachets inside, away from significant and frequent variations in temperature to avoid the risk of condensation during storage.
- If the area is affected by vibration, try to reduce the effect of these vibrations by placing the generator on a damper support (rubber disc or similar) and turn the rotor a fraction of a turn once a fortnight to avoid marking the bearing rings.

WARNING

This manual is applicable to the LSA 50.1 alternator manufactured at Sillac commencing from serial number : 132000

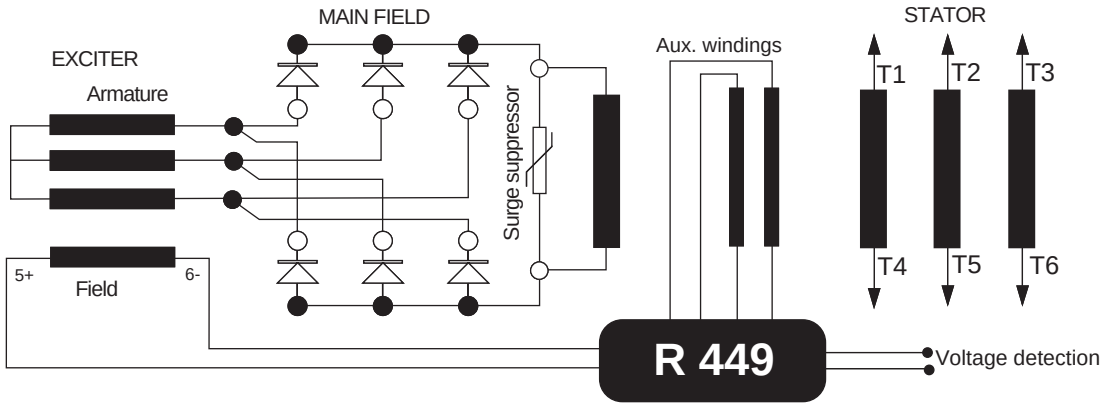
This manual is applicable to the LSA 51.2 alternator manufactured at Orléans commencing from serial number : 168500.

2 - TECHNICAL CHARACTERISTICS

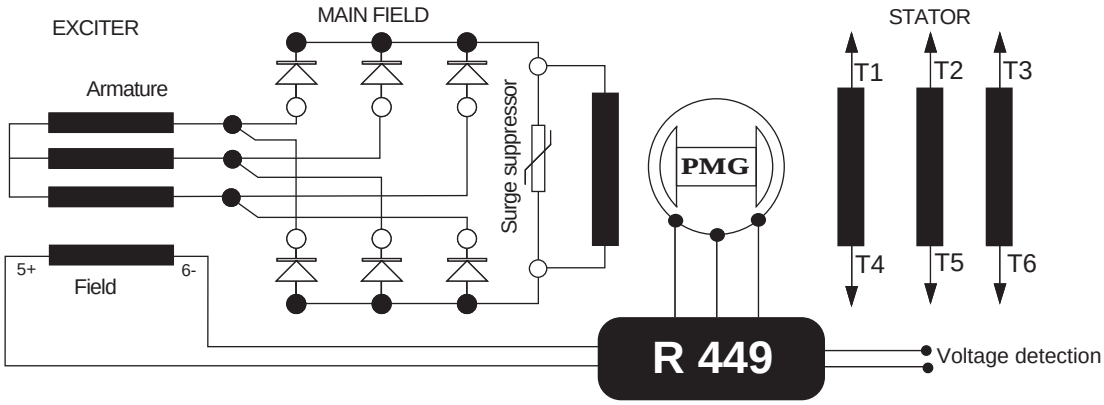
2.1 - Electrical characteristics

LSA 50.1 / 51.2 alternators are machines without sliprings or revolving field brushes, wound as "2/3 pitch", 6-wire, with class H insulation and a field excitation system available in either AREP+PMI or "PMG" version (see diagrams).

AREP+PMI system with R 449



PMG system with R 449



Interference suppression conforms to standard EN 55011, group 1, class B.

2.1.1 - Options

- Stator temperature detection probes
- Space heaters

2.2 - Mechanical characteristics

- Steel frame
- End shields in cast iron
- Greasable ball bearings
- Mounting arrangement

MD 35 :
single bearing with standard feet and SAE flanges/coupling discs.
B 34 :
two-bearing with SAE flange and standard cylindrical shaft extension.
- Drip-proof machine, self-cooled
- Degree of protection : IP 23

2.2.1 - Options

- Air inlet filter, air outlet filter

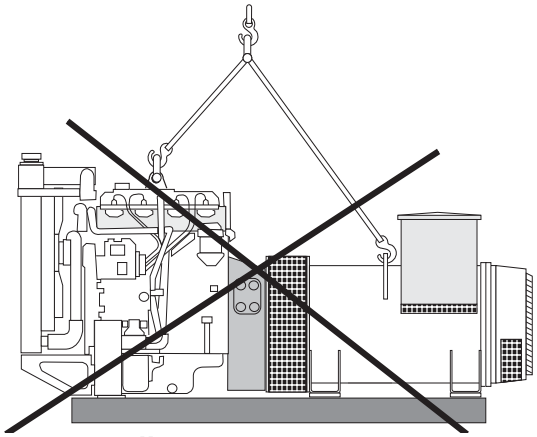
3 - INSTALLATION

3.1 - Assembly

All mechanical handling operations must be undertaken using approved equipment.
The machine should remain horizontal during handling.

3.1.1 - Handling

The generously-sized lifting rings are for handling the alternator alone. They must not be used to lift the genset. Choose a lifting system which respects the positioning of the rings.



3.1.2 - Coupling

3.1.2.1 - single bearing alternator
Before coupling the two machines, check that both are compatible by :
- undertaking a torsional analysis of the transmission
- checking the dimensions of the flywheel and its housing, the flange, coupling discs and offset

WARNING

When coupling the alternator to the prime mover, the holes of the coupling discs should be aligned with the flywheel holes by rotating the primary pulley on the thermal engine.
Do not use the alternator fan to turn the rotor.
Tighten the coupling disc screws to the recommended torque (see section 4.6.2.) and check that there is lateral play on the crankshaft.
3.1.2.2 - two-bearing alternator
- Semi-flexible coupling
Careful alignment of the machines is recommended, by checking that any differences in the concentricity and parallelism of both parts of the coupling does not exceed 0.1 mm.

WARNING

This alternator has been balanced with a 1/2 key.

3.1.3 - Location

Ensure that the ambient temperature in the room where the alternator is placed cannot exceed 40°C for standard power ratings (for temperatures > 40°C, apply a derating coefficient). Fresh air, free from damp and dust, must be able to circulate freely around the air intake grille on the opposite side from the coupling. It is essential to prevent not only the recycling of hot air from the machine or engine, but also exhaust fumes.

3.2 - Inspection prior to first use

3.2.1 - Electrical checks

Under no circumstances should an alternator, new or otherwise, be operated if the isolation is less than 1 megohm for the stator and 100,000 ohms for the other windings.
There are three possible methods for restoring these minimum values.
a) Dry out the machine for 24 hours in a drying oven at a temperature of approximately 110 °C (without the AVR)
b) Blow hot air into the air intake, having made sure that the machine is rotating with the exciter field disconnected.
c) Run in short-circuit mode (disconnect the AVR) :
- Short-circuit the three output power terminals using connections capable of supporting the rated current (try not to exceed 6 A/mm2).
- Insert a clamp ammeter to monitor the current passing through the short-circuit connections.
- Connect a 24 Volt battery in series with a rheostat of approximately 10 ohms (50 W) to the exciter field terminals, respecting the polarity.
- Open fully all the alternator openings.
- Run the alternator at its rated speed, and adjust the exciter field current using the rheostat to obtain the rated output current in the short-circuit connections.
Note : Prolonged standstill : In order to avoid these problems, we recommend the use of space heaters, as well as turning over the machine from time to time. Space heaters are only really effective if they are working continuously while the machine is stopped.

3.2.2 - Mechanical checks

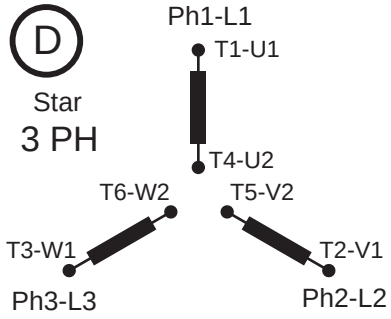
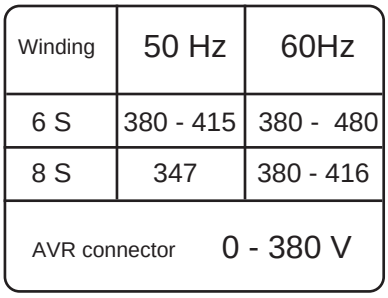
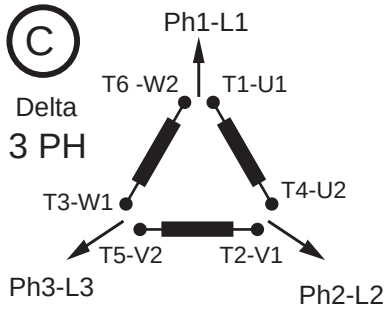
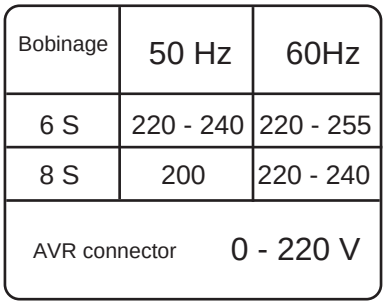
Before starting the machine for the first time, check that :
- all fixing bolts and screws are tight
- cooling air is drawn in freely
- the protective grilles and housing are correctly in place
- the standard direction of rotation is clockwise as seen from the shaft end (phase rotation in order 1 - 2 - 3).
For anti-clockwise rotation, swap 2 and 3.
- the winding connection corresponds to the site operating voltage (see section 3.3)

3.3 - Terminal connection diagrams

To modify the connections, change the position of the terminal cables. The winding code is specified on the nameplate.

3.3.1 - Terminal connection

Any intervention on the alternator terminals during reconnection or checks should be performed with the machine stopped.

Connection code	Voltage L-L	
D Star 3 PH  	 	Factory connection
C Delta 3 PH  	 	Connection using optional kit Consult the factory

4 - SERVICING - MAINTENANCE

4.1 - Safety measures

Servicing or troubleshooting must be carried out strictly in accordance with instructions so as to avoid the risk of accidents and to maintain the machine in its original state.

All such operations performed on the alternator should be undertaken by personnel trained in the commissioning, servicing and maintenance of electrical and mechanical components.
Before any intervention on the machine, ensure that it cannot be started by a manual or automatic system and that you have understood the operating principles of the system.

4.2 - Regular maintenance

4.2.1 - Checks after start-up

After approximately 20 hours of operation, check that all fixing screws on the machine are still tight, plus the general state of the machine and the various electrical connections in the installation.

4.2.2 - Cooling circuit

It is advisable to check that circulation of air is not reduced by partial blocking of the air intake and outlet grilles : mud, fibre, grease, etc.

4.2.3 - Bearings

The bearings are greasable. It is advisable to lubricate the machine during operation. Time intervals and quantity of grease are given in the table below.

Bearing	**6226 C3**	**6232 C3**
Quantity of grease	50 g	70 g
Lubrication interval	3600 H	1700 H
Bearing	**NU 1028 MC3**	
Quantity of grease	35 g	
Lubrication interval	2000 H	

Lubrication intervals are given for a grease of grade
LITHIUM - standard - NLGI 3.
The factory lubrication is performed with grease :
ESSO UNIREX N3 (LSA 50.1)
SHELL RETINAX LX (LSA 51.2).

Before using another grease, check for compatibility with the original one. Monitor the temperature rise in the bearings, which should not exceed 50°C above the ambient temperature. Should this value be exceeded, the machine must be stopped and checks carried out.

4.2.4 - Electrical servicing

Cleaning product for the windings

WARNING

DO NOT USE : TRICHLORETHYLENE, PERCHLORETHYLENE, TRICHLOROETHANE OR ANY ALKALINE PRODUCTS.

Certain strictly defined pure volatile degreasing products can be used, such as :
- Normal petrol (without additives)
- Toluene (slightly toxic); inflammable
- Benzene (or benzine, toxic); inflammable
- Ciclohexare (non toxic); inflammable

Cleaning of the stator, rotor, exciter and diode bridge

The insulating components and the impregnation system are not at risk of damage from solvents (see the list of authorised products).
Avoid letting the cleaning product run into the slots. Apply the product with a brush, sponging frequently to avoid accumulation in the housing. Dry the winding with a dry cloth. Let any traces evaporate before reassembling the machine.

4.2.5 - Mechanical servicing

WARNING

Cleaning the machine using water or a high-pressure washer is strictly prohibited.
Any problems arising from such treatment are not covered by our warranty.
Degreasing : Use a brush and detergent (suitable for paintwork).
Dusting : Use an air gun.
If the machine is fitted with air filters, these should be cleaned regularly according to the environmental conditions.
After cleaning the alternator, it is essential to check the winding insulation (see sections 3.2. and 4.8.).

4.3 - Fault detection

If, when commissioned, the alternator does not work normally, the source of the malfunction must be identified.
To do this, check that :
- the protective devices are fitted correctly
- the connections comply with diagrams in the manuals supplied with the machine
- the speed of the unit is correct (see section 1.3).
Repeat the operations defined in section 3.

4.4 - Mechanical defects

Fault		Cause
Bearing	Excessive overheating of one or both bearings (bearing temperature 50°C above the ambient temperature) (With or without abnormal bearing noise)	- If the bearing has turned blue or if the grease has turned black, change the bearing. - Bearing not fully locked (abnormal play in the bearing cage) - End shields incorrectly aligned
Abnormal temperature	Excessive overheating of alternator frame (more than 40° C above the ambient temperature)	- Air flow (inlet-outlet) partially clogged or hot air is being recycled from the alternator or engine - Alternator operating at too high a voltage (> 105% of Un on load) - Alternator overloaded
Vibrations	Too much vibration	- Misalignment (coupling) - Defective mounting or play in coupling - Rotor balancing fault (Engine - Alternator)
	Excessive vibration and humming noise coming from the machine	- Phase imbalance - Stator short-circuit
Abnormal noise	Alternator damaged by a significant impact, followed by humming and vibration	- System short-circuit - Misparalleling Possible consequences - Broken or damaged coupling - Broken or bent shaft end - Shifting and short-circuit of main field - Fan fractured or coming loose on shaft - Irreparable damage to rotating diodes/AVR

4.5 - Electrical faults

Fault	Action	Effect	Check/Cause
No voltage at no load on start-up	Connect a new battery of 4 to 12 volts to terminals E- and E+, respecting the polarity, for 2 to 3 seconds	The alternator builds up and its voltage is still correct when the battery is removed.	- Lack of residual magnetism
		The alternator builds up but its voltage does not reach the rated value when the battery is removed.	- Check the connection of the voltage reference to the AVR - Faulty diode - Armature short-circuit
		The alternator builds up but its voltage disappears when the battery is removed.	- Faulty AVR - Field windings open circuit (check winding) - Main field winding open circuit (check the resistance)
Voltage too low	Check the drive speed	Correct speed	Check the AVR connections (possible AVR failure) - Field windings short-circuited - Rotating diodes burnt out - Main field winding short-circuited - Check the resistance
		Speed too low	Increase the drive speed (Do not touch the AVR voltage pot. (P2) before running at the correct speed.)
Voltage too high	Adjust AVR voltage potentiometer	Adjustment ineffective	Faulty AVR
Voltage oscillations	Adjust AVR stability potentiometer	If no effect : try normal / fast recovery modes (ST2)	- Check the speed : possibility of cyclic irregularity - Loose connections - Faulty AVR - Speed too low when on load (or LAM set too high)
Voltage correct at no load and too low when on load	Run at no load and check the voltage between E+ et E- on the AVR	Voltage between E+ and E- (DC) AREP / PMG < 10V	- Check the speed (or LAM set too high)
		Voltage between E+ and E- AREP / PMG > 15V	- Faulty rotating diodes - Short-circuit in the main field. Check the resistance. - Faulty exciter armature. Check the resistance.
Voltage disappears during operation	Check the AVR, the surge suppressor, the rotating diodes, and replace any defective components	The voltage does not return to the rated value.	- Exciter winding open circuit - Faulty exciter armature - Faulty AVR - Main field open circuit or short-circuited

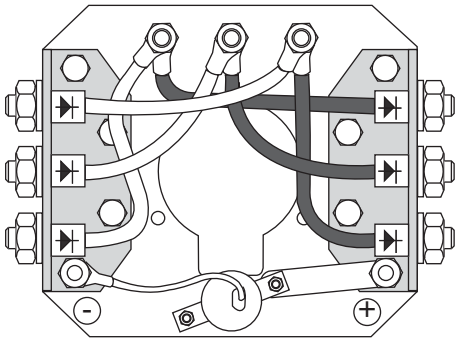
4.5.1 - Checking the winding

You can check the winding insulation by performing a high voltage test. In this case, you must disconnect all AVR wires.

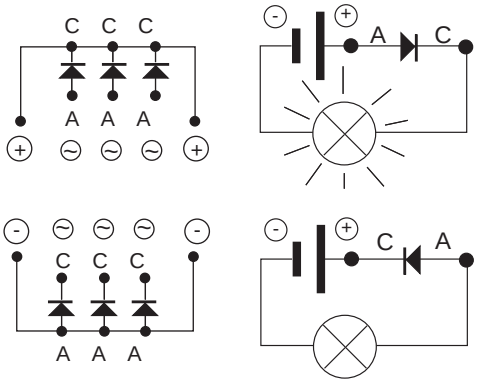
WARNING

Damage caused to the AVR in such conditions is not covered by our warranty.

4.5.2 - Checking the diode bridge



A diode in good working order must allow the current to flow from the anode to the cathode.



4.5.3 - Checking the windings and rotating diodes using separate excitation

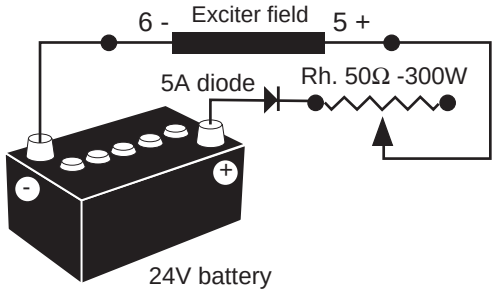
During this procedure, make sure that the alternator is disconnected from any external load and inspect the terminal box to check that the connections are fully tightened.

1) Stop the unit, disconnect and isolate the AVR wires.

2) There are two ways of creating an assembly with separate excitation.

Assembly A : Connect a 24 V battery in series with a rheostat of approximately 50 ohms - 300 W and a diode on both field wires (5+) and (6-).

ASSEMBLY A



Assembly B : Connect a "Variac" variable power supply and a diode bridge on both exciter field wires (5+) and (6-).

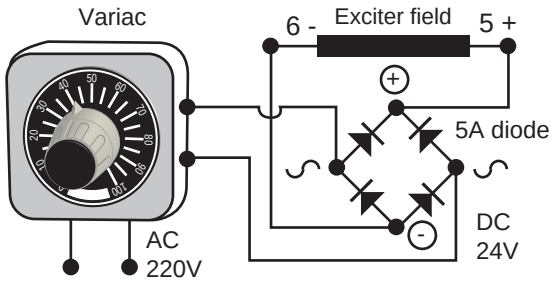
Both these systems should have characteristics which are compatible with the machine field excitation power (see the nameplate).

3) Run the unit at its rated speed.

4) Gradually increase the exciter field current by adjusting the rheostat or the variac and measure the output voltages on L1- L2 - L3, checking the excitation voltage and current at no load and on load (see the machine nameplate or ask for the factory test report).

When the output voltage is at its rated value and balanced within 1 % for the rated excitation level, the machine is in good working order. The fault therefore comes from the AVR or its associated wiring (ie. sensing, auxiliary windings).

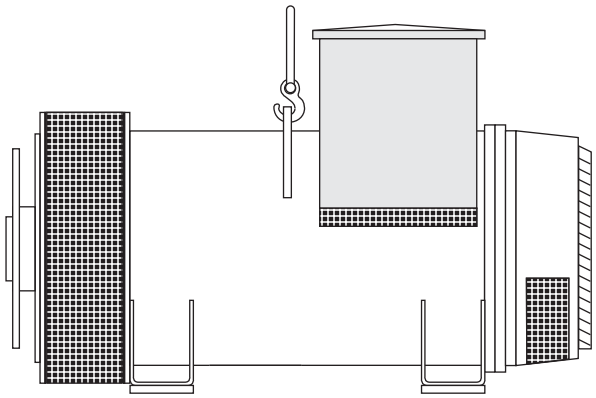
ASSEMBLY B



LSA 50.1 / LSA 51.2
ALTERNATORS
SERVICING - MAINTENANCE

4.6 - Dismantling, reassembly (see sections 5.4.1. & 5.4.2)

During the warranty period, this operation should only be carried out in an approved workshop or in our factory, otherwise the warranty may be invalidated.
Whilst being handled, the machine should remain horizontal.



4.6.1 - Tools required

To fully dismantle the machine, we recommend using the tools listed below :
- 1 ratchet spanner + extension
- 1 torque wrench
- 1 set of flat spanners : 8, 10, 18, 19 mm
- 1 socket set : 8, 10, 13, 16, 18, 19, 21, 24, 30 mm
- 1 socket with male ferrule : 5 mm
- 1 puller (U35) / (U32/350)

4.6.2 - Screw tightening torque

IDENTIFICATION	screw Ø	Torque N.m
Diode bridge screw	M 6	5.6
Diode nut	M 12	10
Shield / Frame screw	M 12	62
Discs / Sleeve screw	M 20	300
Earth screw	M 12	46
Grille screws	M 12	46
Terminal box screws	M 6	5.6
Stator connection nut	M 12	46

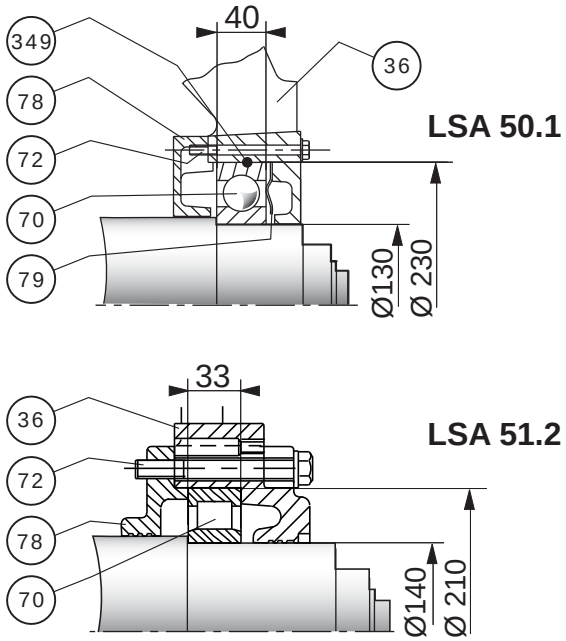
4.6.3 - Access to diodes

- Open the air intake grille (47).
- Disconnect the diodes and check them using an ohmmeter or a battery lamp (see section 4.5.2).
- Reassemble and reconnect the unit.

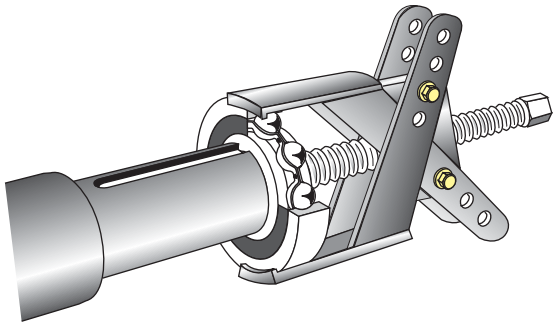
4.6.4 - Access to connections and the regulation system

Access directly by removing the box lid (48) and the inspection door (59).

4.6.5 - Fitting and replacing the NDE bearing



- Remove the air intake grille (47).
- Disconnect the diode bridge (106) : 5 leads.
- Remove the 3 screws of the diode bridge on the shaft.
- Remove the diode bridge.
- Remove the 4 screws (72) of the inner bearing retainer (78).
- Remove the 6 six screws of the shield (36) on the stator (1).
- Tap off the NDE shield (36) together with the exciter field (90) of the stator (1).
- Extract the ball bearing (70) with a puller.

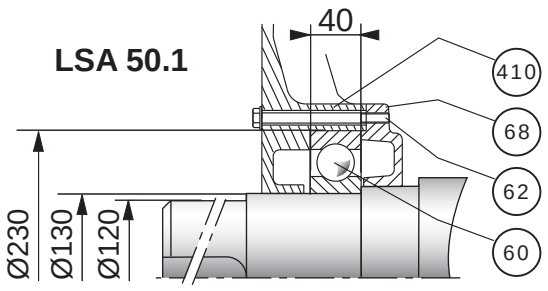


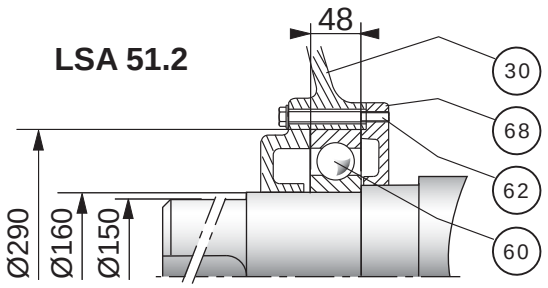
- Check the "O" ring seal (349) and the preloading wavy washer (79) and replace them if necessary.
- Fit a new bearing, after heating it by induction system to 80°C maximum.

WARNING

WHEN DISMANTLING THE MACHINE, ALWAYS CHANGE THE BEARINGS.

4.6.6 - Replacing the DE bearing on two-bearing machines





- Remove the 6 screws (411) and 4 screws (62).
- Tap off the DE shield (410) from the stator (1.)
- Extract the ball bearing (60) with a puller.
- Fit the new bearing, after heating it by induction system to 80°C maximum.

WARNING

WHEN DISMANTLING THE MACHINE, ALWAYS CHANGE THE BEARINGS.

4.6.7 - Complete dismantling

- Remove the 6 screws (411).
- Support the DE rotor (4) with a strap.
- Remove the NDE shield (36) (section 4.6.5).
- Support the rotor with a tube on the NDE shaft extension.
- Push the rotor out of the stator, with care.
- If necessary, dismantle the coupling system and the DE shield (410).

4.6.8 - Reassembling the bearings

- Place the "O" ring seal (349) and the preloading wavy washer (79) in the bearing seat (36).
- Fit the NDE shield (36) and the DE shield (410) on the stator (1).
- Tighten the 12 screws of the shield on the stator.
- Fit the inner bearing retainer with appropriate lubrication (68 and 78).
- Tighten the 4 screws on the bearing retainer (68 and 78).
- Refit and connect the diode bridge (section 4.6.5).
- Refit the air intake grille (47).

4.6.9 - Reassembling the rotor

See sections 4.6.7 and 4.6.8

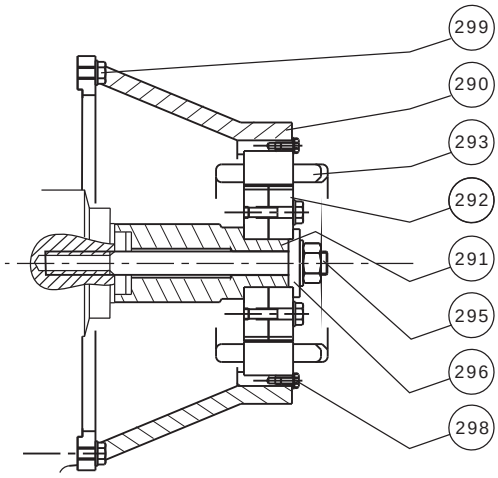
WARNING

If the rotor has been fully rewound, it must be rebalanced.

After operational testing, replace all access panels or covers.

4.7 - Installation and maintenance of the PMG

The PMG reference for the 50.1/51.2 is PMG 4



4.7.1 - Mechanical characteristics and assembly

The assembly consists of :
- an adaptation shaft (position the PMG on the alternator shaft extension) (291)
- an M20 tie rod, with a cable gland washer and nut for assembling the rotor (295 and 296)
- a rotor with 16 magnets (292)
- the stator assembly with leads (293)
- the PMG housing (290)

4.7.2 - Assembling the PMG

- Remove the air intake grille (47).
- Mount the rotor on the adaptation shaft.
- Mount the rotor assembly on the shaft (4) with the tie rod and tighten the M20 nut.
- Mount the stator in the PMG housing and tighten the screws.
- Fit the stator assembly on the NDE shield (36).
- Tighten the PMG screws on the NDE shield.
- Connect the stator leads on the PMG.
- Fit the spacer for the air intake grille.
- Finally, fit the air intake grille (47).

Note : Check the air gap on the PMG.
Note : Ideally, the PMG should be fitted on a machine which

has already been assembled.

4.7.3 - Electrical connection

- Connect the 3 PMG wires (14/15/16) to terminals X1,X2,Z2 on the AVR (see 2.3.2). If the alternator is being connected to an AREP machine, the 4 auxiliary winding wires X1.X2.Z1.Z2 should be isolated using the domino fitting supplied with the kit. Both field wires (5/6) and the voltage sensing wires (2/3) remain in place.

Electrical characteristics of the PMG 4 :
Stator phase/phase resistance 20°C : 1.4 Ω
No-load A.C. voltage between phases at 1500 rpm : 250 V

4.8 - Table of electrical characteristics

Alternator - 4 poles - 50/60 Hz - Standard winding No. 6S. (400V- 50 Hz for the excitation values)
The voltage and current values are given for no-load operation and operation at rated load with separate field excitation. All values are given at ± 10% and may be changed without prior notification (for exact values, consult the test report).

4.8.1 - LSA 50.1 characteristics

Resistances at 20°C (Ω)

LSA 50.1	STATOR L/N	ROTOR	Field	Armature
S2	0.0028	0.354	9.35	0.052
S4	0.00195	0.385	9.35	0.052
M6	0.0015	0.43	9.35	0.052
M7	0.0013	0.46	9.35	0.052
L8	0.0012	0.5	9.35	0.065
VL10	0.00095	0.556	9.35	0.065

Resistance of AREP auxiliary windings at 20°C (Ω)

LSA 50.1	Auxil wdg : X1, X2	Auxil wdg : Z1, Z2
S2	0.105	0.215
S4	0.105	0.170
M6	0.085	0.185
M7	0.085	0.15
L8	0.08	0.15
VL10	0.08	0.18

Field excitation current i exc (A)
Symbols : "i exc" : excitation current of the exciter field.

LSA 50.1	No load	At rated load
S2	1.05	5
S4	1.05	4.85
M6	1.1	4.9
M7	1.1	4.9
L8	1.3	5
VL10	1.3	5

For 60 Hz machines, the "i exc" values are approximately 5 to 10 % lower.

4.8.2 - LSA 51.2 characteristics

Resistances at 20°C (Ω)

LSA 51.2	STATOR L/N	ROTOR	Field	Armature
S55	0.001	0.42	9.2	0.04
M60	0.0008	0.45	9.2	0.04
L70	0.0006	0.5	9.2	0.04
VL85	0.0005	0.58	9.2	0.04

Resistance of AREP auxiliary windings at 20°C (Ω)

LSA 51.2	Auxil wdg : X1, X2	Auxil wdg : Z1, Z2
S55	0.1	0.16
M60	0.08	0.16
L70	0.09	0.13
VL85	0.06	0.13

Field excitation current i exc (A)
Symbols : "i exc" : excitation current of the exciter field.

LSA 51.2	No load	At rated load
S55	1.5	6
M60	1.5	5.9
L70	1.6	5.5
VL85	1.6	5

For 60 Hz machines, the "i exc" values are approximately 5 to 10 % lower.

4.8.3 - Voltage of auxiliary windings at no load

LSA 50.1	Auxil wdg : X1, X2	Auxil wdg : Z1, Z2
50 Hz	90 ... 100 V	10 V
60 Hz	108 ... 120 V	12 V

LSA 51.2	Auxil wdg : X1, X2	Auxil wdg : Z1, Z2
50 Hz	90 ... 100 V	10 V
60 Hz	108 ... 120 V	12 V

5 - SPARE PARTS

5.1 - First maintenance parts

Emergency repair kits are available as an option.
The **Emergency Kit** consists of a set of 6 diodes, a varistor, an AVR and 2 fuses, loose.
The **Rotating Diode Assembly** consists of the disk, the 6 diodes, and the varistor, assembled.

Rep	Description	Qty	LSA 50.1
	Emergency kit		ALT050KD002
	6 Diodes set		ALT050KD001
112	Varistor	1	18140275087
198	AVR	1	R 449
	Spare 16A fuses set	1	PEL016FG005
106	**Rotating diode**	1	DT0813938
	Others spare parts		
60	D.E. bearing	1	6226 C3
70	N.D.E. bearing	1	6226 C3

Rep	Description	Qty	LSA 51.2
	Emergency kit		ALT050KD002
	6 Diodes set		ALT050KD001
112	Varistor	1	18140275087
198	AVR	1	R 449
	Spare 16A fuses set	1	PEL016FG005
106	**Rotating diode**	1	DT0813938
	Others spare parts		
60	D.E. bearing	1	6232 MC3
70	N.D.E. bearing	1	NU 1028MC3

5.2 - Technical support service

Our technical support service will be pleased to provide any additional information you may require.
When ordering spare parts, you should indicate the complete machine type, its serial number and the information given on the nameplate.
Adress your enquiry to your usual contact.
Part numbers should be identified from the exploded views and their description from the parts list.
Our extensive network of service centres can dispatch the necessary parts without delay.
To ensure correct operation and the safety of our machines, we recommend the use of original manufacturer spare parts. In the event of failure to comply with this advice, the manufacturer cannot be held responsible for any damage.

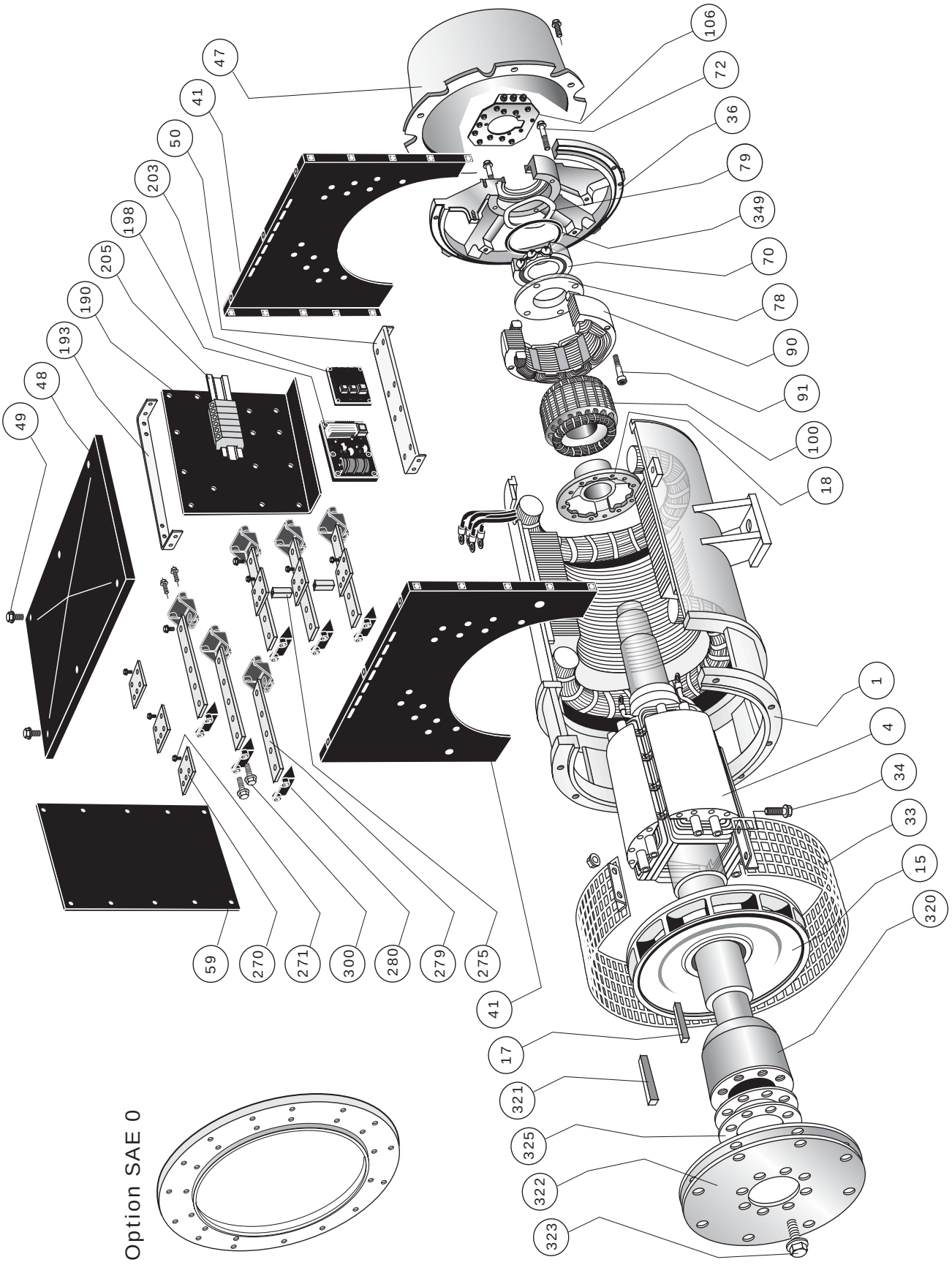
5.3 - Exploded views, parts list

5.3.1 - Parts list

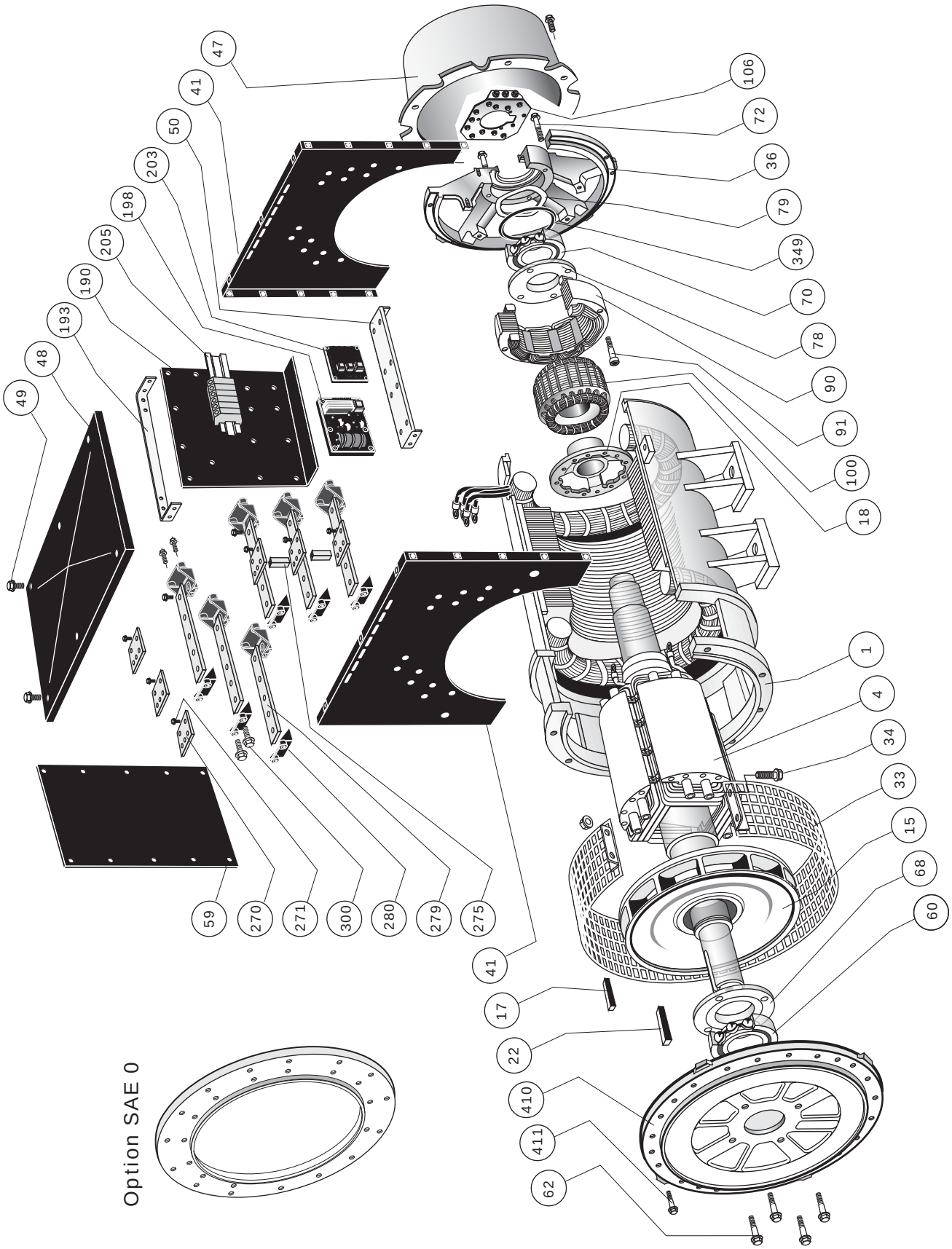
Ref.	Qty	Description
1	1	Stator assembly
4	1	Rotor assembly
15	1	Turbine
17	1	Fan key
18	1	Balancing disc
22	1	Key for 2-bearing shaft extension
33	1	Fan guard
34	1	Fixing screw
36	1	Bearing on exciter end
41	2	Cover front panel
47	1	Air inlet cover
48	1	Cover top panel
49	-	Cover screws
50	2	Cover spacer
59	2	Cover inspection door
60	1	DE bearing
62	4	Fixing screw
68	1	Inner bearing retainer
70	1	NDE bearing
72	4	Fixing screw
78	1	Inner bearing retainer
79	1	Preloading wavy washer
90	1	Exciter field
91	5	Fixing screw
100	1	Exciter armature
106	1	Rotating diode bridge assembly
190	1	AVR support
193	1	Cover spacer
198	1	Voltage regulator (AVR)
203	1	Optional module
205	1	Connector link
265	1	Air intake grille spacer
270	6	Connection plate
271	30	Vis
275	2	Neutral connection
279	6	Connection bar
280	12	Support
290	1	PMG housing
291	1	Adaptation shaft
292	1	Magnetic rotor
293	1	Stator
295	1	Tie rod
296	1	Cable gland washer + nut
298	5	Screws
299	5	PMG adaptor screws
300	24	Screws
320	1	Coupling sleeve
321	1	Sleeve key
322	4	Coupling disc
323	12	Fixing screw
325	-	Spacer shim
349	1	"O" ring
410	1	DE shield
411	6	Fixing screw

LSA 50.1 / LSA 51.2
ALTERNATORS
SPARE PARTS

5.3.2 - Exploded view : single-bearing LSA 50.1

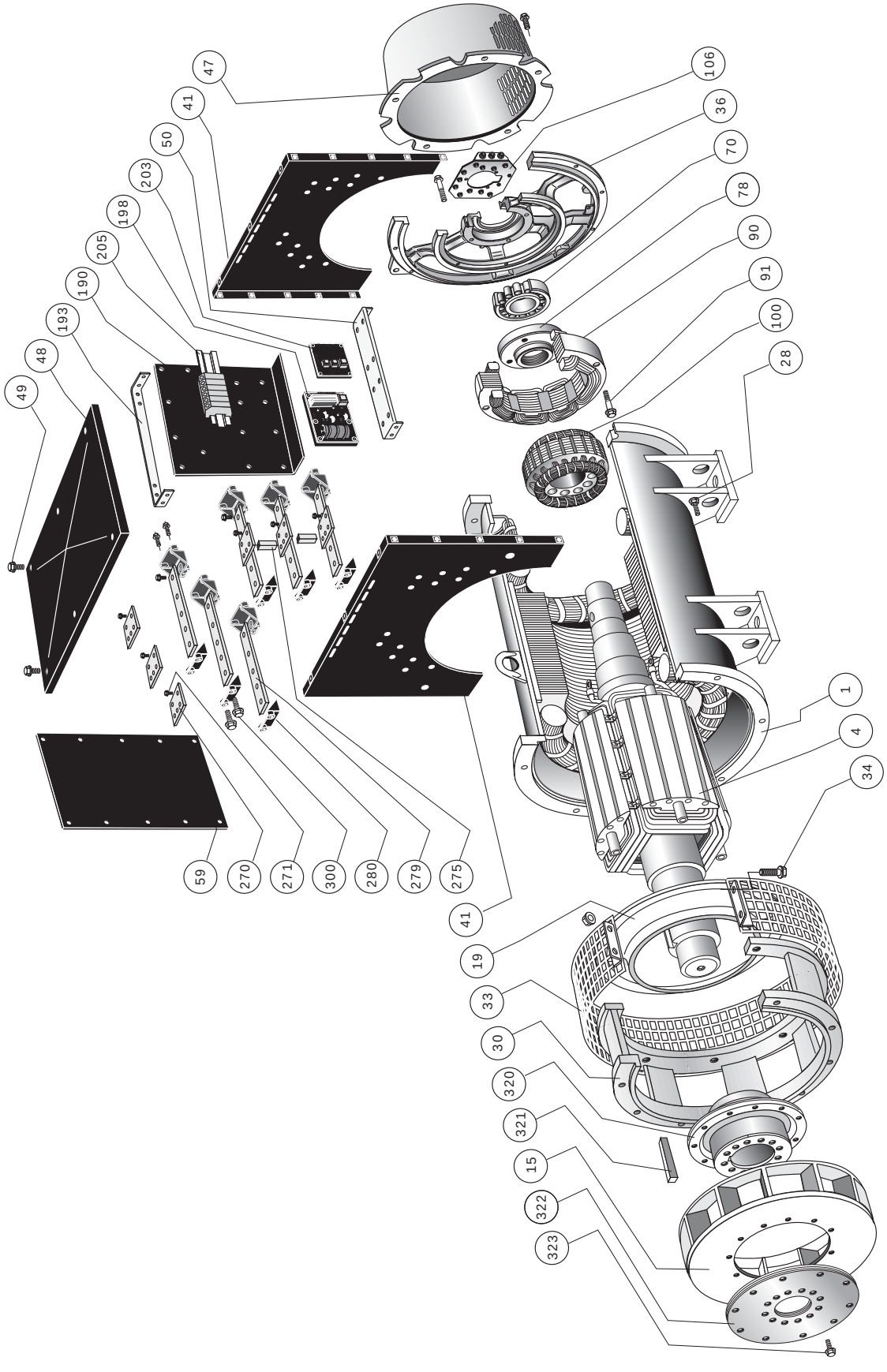


5.3.3 - Exploded view : two-bearing LSA 50.1



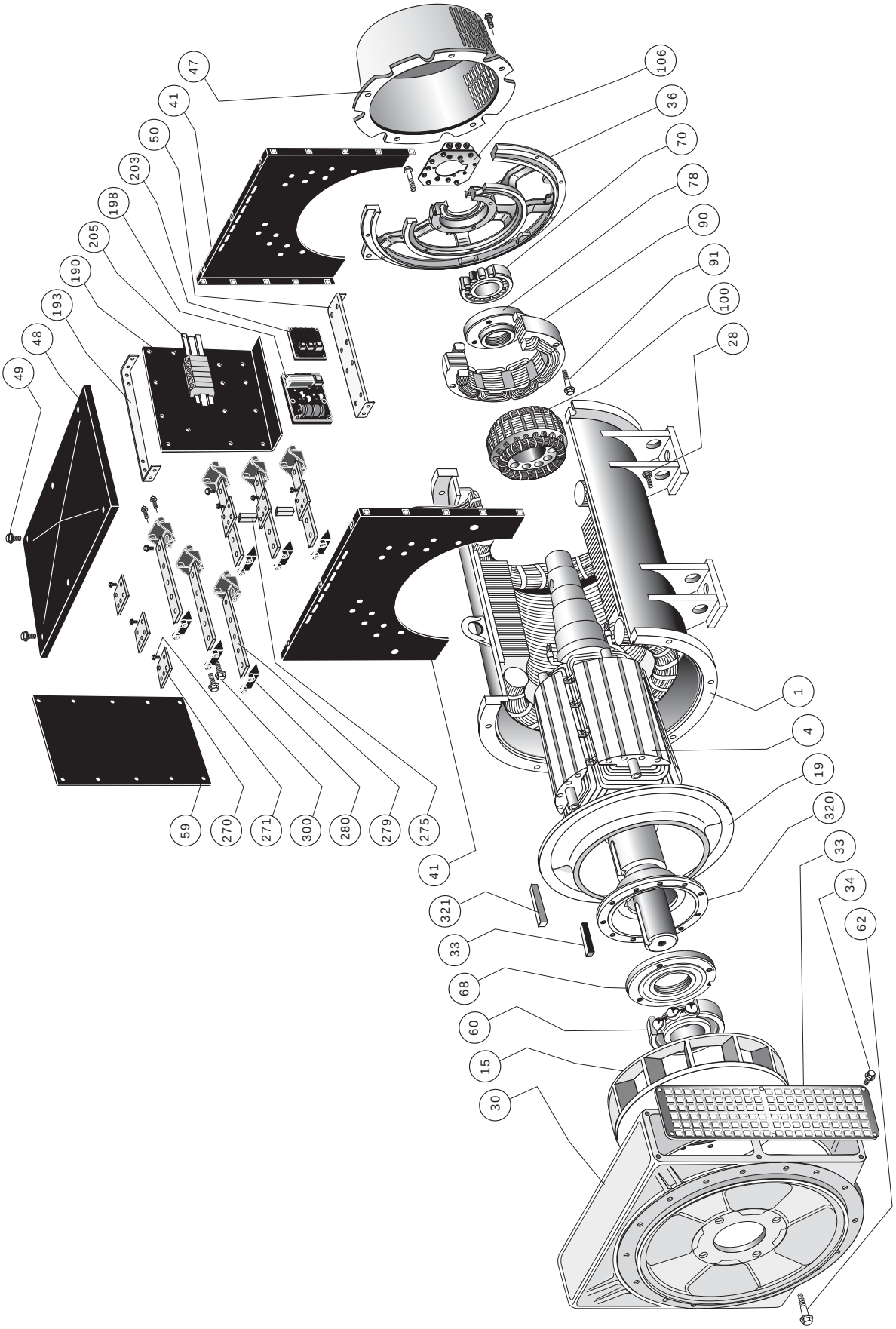
LSA 50.1 / LSA 51.2
ALTERNATORS
SPARE PARTS

5.3.4 - Exploded view : single-bearing LSA 51.2



LSA 50.1 / LSA 51.2
ALTERNATORS
SPARE PARTS

5.3.5 - Exploded view : two-bearing LSA 51.2



LEROY SOMER
Alternator Division

6 June 2007

EC DECLARATION OF INCORPORATION

Concerns electric generators designed to be incorporated in machines subject to Directive no. 98/37/EC.

The manufacturer : Moteurs LEROY-SOMER
Boulevard Marcellin Leroy
16015 ANGOULEME (France)

Herein declares that the electric generators in the PARTNER range (low voltage) and those series based on them conform to the following standards and directives:

- EN and IEC 60034-1 and 60034-5

- ISO 8528-3 (Design of alternators for generator applications)

- Low Voltage Directive no. 73/23/EC dated 19 February 1973, modified by Directive no. 93/68/EC dated 22 July 1993

These generators are designed to be used in complete power generating sets which must comply with the following standards and directives:

- Machinery directive no. 98/37/EC

- EMC directive no. 89/336/EC modified by Directives nos. 92/31 EC dated 28 April 1992 and 93/68/EC dated 22 July 1993, concerning the intrinsic characteristics of emission and immunity levels.

- Standard EN 60204-1 (Electrical Equipment of Industrial Machines)

WARNING:

The above-mentioned generators must not be commissioned until the machines in which they are to be incorporated have been declared as conforming to Directives nos. 98/37/EC and 89/336 EC and any other directives that may be applicable.

Ref : 4152 en – 06.2007/a

ALTERNATOR DIVISION

MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

338 567 258 RCS ANGOULÊME
S.A. au capital de 62 779 000 euros

www.leroy-somer.com